

A b s t r a c t

The method of wave diagnostics of the oil-and-gas deposit belongs to the area of the seismic survey of the oil-and-gas deposits on the basis of the complex of waves of the different types. It is performed by means of the insonification of the vicinity of the borehole by the seismic waves, the recording of the displacement vectors of the direct longitudinal and shear waves using the three-component seismic profiling in the investigated borehole, the data processing of the detailed profiling for the obtaining of the dynamical, rheological and absorbing parameters of the rock, and the geological interpretation of the above-mentioned parameters for the obtaining of the quantitative estimates of the reservoir and fluid-saturated properties of the rocks for each observation point lengthways depth of the borehole.

The accuracy of the estimated values of the dynamical parameters which are received by means of the parametrical analysis and decoding of the monotype temporal signals for the compression and shear components of the direct longitudinal wave is checked, using the computer modelling of seismic signals. By means of the coprocessing of the observation downhole and check data dynamical parameters for the downhole data are corrected, moreover the changes of the conditions of the wave excitation and the presence of the filtrational effect from the covering thickness of the rocks for each observation point lengthways depth of the borehole are taking into account that allows to calculate the dynamical parameters of the impulse responses and then to find the respective petrophysical parameters of the layers of the rocks.

Further the petrophysical parameters are converted into the shape of the oil-field data - the coefficients of porosity, the linear density of fractures, granular and fissured permeability, residual water saturation and fluid saturation of the rock layers, and calibrated values of the absorption coefficients for the compression component of the direct longitudinal wave are used as the indicators of the content of the fluid and its type (oil, gas or water). Diagnosing the oil-and-gas deposit is realized by means of the use of the totality of the above-mentioned oil-field parameters, moreover their information density guarantees the exact identification of the image of the oil-and-gas deposit, and at the same time it guarantees the reception of the reliable information about the effective thickness of layers and the location of the gas-oil-water contacts which can be used for the calculations of the oil and gas reserves.

The predicted areas of the applied utilization of the declared method of wave diagnostics of the oil-and-gas deposit: during the exploration drilling when it is necessary to detect the reservoir, the cap rocks and the presence of the oil-and-gas-bearing layers; in the development drilling during the reservoir engineering of the oil-and-gas deposits; for the monitoring of the reservoir engineering of the oil-and-gas deposits.